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Sustainability Statement
16 Avenue Road

Ground Floor
57a Great Suffolk Street
London
SE1 0BB

[redacted]
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Prepared by:
Becky Armstrong
Ground Floor
57a Great Suffolk Street
London
SE1 0BB

Email:
[redacted]

Date of current issue:
30/09/2016

Issue No:
3

Our Ref:
1840-16 Avenue Road-Sustainability Strategy-1609-27ba.doc

Prepared for:
Laura Bell,
Wolff Architects
16 Lambton Place
Notting Hill
London
W11 2SH

eight associates

Ground Floor
57a Great Suffolk Street
London
SE1 0BB

[redacted]
www.eightassociates.co.uk

Issue Status
16 Avenue Road
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Prepared by:	Becky Armstrong
Signature:	BA
Quality Assured by:	Oliver Morris
Signature:	OM

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Ground Floor
57a Great Suffolk Street
London
SE1 0BB

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Executive Summary

The proposal at 16 Avenue Road comprises the reconstruction of a 3 storey dwelling in the London Borough of Camden, with a subterranean basement element and garden at the rear of the property. The dwelling has a total Gross Internal Area of 1,685 m^2.

The scheme will target a reduction in carbon emissions over Part L and demonstrate the required level of sustainability in its design, construction and operation. The development is located on 16 Avenue Road in the London Borough of Camden.

This Sustainability Statement will be provided as evidence to the local authority of the actions being taken to demonstrate the development's holistic approach to sustainable design and construction. It provides a summary of the contribution that the design will make to creating a more sustainable development, drawing on information provided by specialist consultants and design reports and identifying key features intrinsic to achieving low carbon homes.

Key sustainability features within the development will include:

- A 35.48% reduction over Part L1A 2013 following the energy hierarchy as required by the London Plan Policy 5.2
- More than 20% reduction in CO_2 over Building Regulations Part L 2013 through the use of renewables.
- A water consumption target of 105 litres/person/day through implementation of water efficiency and reuse measures.
- A sustainable materials procurement policy and an efficient waste strategy on site including at least 85% of waste to be diverted from landfill.
- The inclusion of sustainable transport options such as cycle storage and a home office to allow the occupants to work from home.
- Protection and enhancement of ecology on site and the appropriate actions to ensure protected species including, but not restricted to, bats and great crested newts.
- The inclusion of a green roof (82.85m^2) to reduce and delay the discharge of rainfall into public sewers and watercourses, thereby minimising the risk and impact of localised flooding and on and off-site watercourse pollution.
- An emphasis on local supply and labour to encourage employment opportunities and to offer a diverse, self-sustaining environment.

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Executive Summary
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Executive Summary (continued

In summary, the key measures incorporated to meet planning requirements and to achieve a low carbon development address the following key areas of sustainable design and construction:

- **Energy and CO_2**
- **Materials and Waste**
- **Water Management**
- **Biodiversity and People**

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Introduction
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Sustainability Introduction

The design team has significant experience in delivering schemes that are considered highly sustainable, either through application of formal green building rating systems, such as Code for Sustainable Homes, BREEAM or SKA, as well as applying benchmarks from standards such as Passivhaus Design, and adopting precedents from industry exemplar sustainable developments.

The 16 Avenue Road scheme is not required to comply with Code for Sustainable Homes following the Government's Deregulation Bill issued in March 2015. To reflect the holistic nature of the scheme and to demonstrate the commitment of sustainable development to London Borough of Camden, the scheme will target a 20% reduction of CO_2 through the use of renewable technology.

The scheme will also demonstrate its commitment to sustainable development in the following areas:

Economic Provision of additional housing in an area of need, and the use of local labour to boost employment.

Social Community engagement during development design to ensure the building matches the needs of the local populous. Alleviating fuel poverty in the region as well as the shortfall in new, quality build households is also addressed.

Ecological Improvement of nesting and foraging for bats and birds through introduction of native planting within the sites and adequate protection of protected and priority species.

Description of Site

The site is located on 16 Avenue Road in the London Borough of Camden. The 16 Avenue Road scheme comprises the construction of a 3 storey subterranean basement and garden.

The aspiration for the scheme is to significantly improve the existing site and its immediate environment by providing an efficient and inclusive development, which meets the policy recommendations of the London Borough of Camden.

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Policy Context
16 Avenue Road
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National Context: The 2008 Climate Change Act

The UK Government is committed to reducing the UK's carbon emissions by 80% over 1990 levels through the Climate Change Act 2008. Achieving truly sustainable design and construction and forwarding the green agenda within the construction industry across the UK is inherent to meeting these emission targets. This development aims to do both of these.

To help monitor carbon reductions and to plot progress being made for future plans and investments in the UK's low-carbon economy, intermediary targets have been established. The UK is currently in the second of four established carbon budgets, in which a 29% in CO_2 emissions is required by the end of 2017 to ensure that the UK remains on course for meeting the 80% reduction by 2050.

Concurrent with reducing CO_2 emissions by 80% by 2050 is the European Climate Change Policy targets. It sets the objective of ensuring 20% of energy consumption is generated from renewable sources by 2020 whilst also reducing Europe's carbon footprint by 20%. Ensuring a fabric first approach with consideration to renewable energy production fits both the climate change act and the European Commission's 2020 targets for reducing greenhouse gas (GHG) emissions.

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London
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Policy Context
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Local Context: London Borough of Camden Planning Policies

Local Development Framework: Core Strategy 2011 - London Borough of Camden Policy 13, 17 and 18

The 16 Avenue Road scheme meets the requirements of the London Borough of Camden's Core Strategy Policy 29 and 30, including the following:

- Ensuring patterns of land use that minimise the need to travel by car and help support local energy networks.
- Promoting the efficient use of land and buildings.
- Minimising carbon emissions from the redevelopment, construction and occupation of buildings by implementing, in order, all of the elements of the following energy hierarchy:
    a. Ensuring developments use less energy,
    b. Making use of energy from efficient sources, such as the King's Cross, Gower Street, Bloomsbury and proposed Euston Road decentralised energy networks; and
    c. Generating renewable energy on-site.
- Ensuring buildings and spaces are designed to cope with, and minimise the effects of, climate change.
- Include facilities for the storage and collection of waste and recycling.
- The provision of new or enhanced habitat, where possible, including through biodiverse green or brown roofs and green walls.

Local Development Management Plan – London Borough of Camden policy DP22 and DP23

The 16 Avenue Road scheme meets the requirements of the London Borough of Camden's Local Development Plan Policy DM22 and DM23, including the following:

- Incorporate sustainable design and construction measures and green or brown roofs and green walls wherever suitable.
- Climate change adaptation measures, such as:
    a. Summer shading and planting;
    b. Limiting run-off;
    c. Reducing water consumption;
    d. Reducing air pollution; and
    e. Not locating vulnerable uses in basements in flood-prone areas.
- Incorporating water efficient features and equipment and capturing, retaining and re-using surface water and grey water on-site.
- Limiting the amount and rate of run-off and waste water entering the combined storm water and sewer network through the methods outlined in part a) and other sustainable urban drainage methods to reduce the risk of flooding.
- Ensuring flood risk
- All proposals for residential development must meet the requirements set out in the Building Regulations.

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Policy Context
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Camden Local Plan 2016 – CC1 Climate change mitigation; CC2 Adapting to climate change

Camden's local plan addresses the importance of the borough's need to minimise potential impacts of future climate change, including the following:

- The potential for overheating in future climate change scenarios should be considered, as Camden is at particular risk of rising temperatures, and impact of the urban heat island effect.
- The increased risk of flooding as an impact of climate change within the Borough, and all developments should aim to reduce existing run off rates post development
- Camden Council has set a target to reduce carbon dioxide emissions by 40% by 2050. Therefore developments must be energy efficient.
- Optimise the use of resource efficiency through the reuse of materials from demolition, and the specification of low embodied carbon materials.
- Reducing waste, energy and water use during construction.

Local Development Management Plan – Camden Planning Guidance on Sustainability

The Camden Planning Guidance supports the policies outlined in the Local Development Plan. The guidance document sets out a number of recommendations to improve the sustainability of the Borough, including the following:

- Basement extensions must not cause harm to the built or natural environment, cause flooding or ground instability.
- The development must tackle climate change through higher environmental standards: all developments to target at least a 20% reduction in carbon dioxide emissions through the installation of on-site renewable energy.
- Promoting sustainable design and construction: at least 10% of the total value of materials to be derived from recycled and reused sources; new materials must be specified from suppliers with responsible sourcing schemes; carrying out a SWMP.
- Water efficiency: developments designed to be water efficient, minimising water use and maximising the reuse of water, with gardens fitted with water butts;
- Developments are expected to incorporate SuDS design to reduced surface water run-off.

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Energy and CO_2
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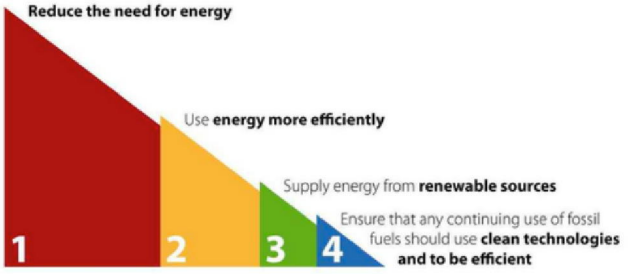
The Energy Hierarchy:

The proposed scheme has followed the energy hierarchy that is illustrated below:



This methodology widely used in accordance with meeting the Sustainable Design and Construction (SPG), has been adopted for the scheme using a 'Lean', 'Clean', and Green' approach in addressing London Borough of Camden's CS13 policy. A summary of the savings in carbon emissions are shown below:

GLA's Energy Hierarchy – Regulated Carbon Emissions [1]				
	Baseline:	Be Lean:	Be Clean:	Be Green:
CO_2 emissions (Tonnes CO_2/yr)	*20.06*	*19.56*	*14.12*	*12.94*
CO_2 emissions saving (Tonnes CO_2/yr)	-	*0.50*	*5.44*	*1.18*
% saving over the previous stage	-	*2.5%*	*27.1%*	*5.9%*
Total CO_2 emissions saving (Tonnes CO_2/yr)	*7.12*			
35.48% of total carbon emissions savings over Part L of the Building Regulations 2013 achieved.				

[1] The figures outlined in this summary are provided from Carnell Warren Associates Energy Strategy Summary and associated SAP calculation worksheets

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Energy and CO_2
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Be Lean (Energy Efficiency)

Low carbon principles have been applied throughout the design of the scheme. The energy strategy follows the 'energy hierarchy' by looking foremost at delivering significant CO_2 savings through passive design and better practice energy efficiency measures.

Through adopting passive energy efficiency measures, the energy demands of the properties within the development will be reduced. Passive efficiency measures are those that reduce energy demand, for example, the use of insulation to reduce building heat loss.

Passive energy efficiency measures that are to be included in the proposed development include:

- Optimal insulation levels and high performance windows and doors;
- Low building air permeability;
- Approved Construction Details minimising the impacts of cold bridging;
- Effectively insulated pipework and ductwork; and
- Optimal glazing arrangements to make best use of the sun's energy whilst minimising the risk of overheating.

Be Clean (CHP)

A CHP system is to be designed into the development and outlined as the most appropriate option for the scheme in accordance with Carnell Warren Associates Energy Strategy.

Usually CHP systems are best utilised where there is a consistent and high demand for heat. As there is a relatively small electricity supply and demand for this scheme, a small scale CHP system has been specified to generate electricity and heat energy. The specified CHP will meet the base heat load and is likely to require the export of electricity to the grid. A typical CHP for the development size is likely to be 5-6kWe.

Be Clean (Heating and Cooling)

To ensure high quality and sustainable design, the development will feature the following measures:

<u>Internal heat generation minimisation</u>

- Energy efficient equipment: this will help reduce internal heat gain, improving the effectiveness of natural ventilation and reducing cooling loads.
- LED lighting: low energy lighting will be specified to reduce lighting power consumption.

<u>Solar gain reduction</u>

- Heat transfer: Insulation levels have been maximised and the resulting u-values are lower than required by Building Regulations. The build-ups therefore prevent the penetration of heat as much as practically possible.
- Air permeability: A reduced air permeability rate of 3.6 $m^3/(hr.m^2)$ @ 50 pa has been targeted to minimise uncontrolled air infiltration.

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Energy and CO_2
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Be Clean (Heating and Cooling) *continued...*	<u>Internal building heat management</u> - Room heights: High ceilings are traditionally used in hot climates to allow thermal stratification. The proposed building will have floor to ceiling heights of approximately 3.6m on average. As the roof will be well insulated to achieve a u value of 0.16 W/m^{2}K (flat roof), there will be minimal penetration of heat through the roof. - A green roof has been considered to be unpractical by the design team. Consequently, a roof covering with a high albedo (reflective) surface has been specified in order to minimise the heat absorbed by the roof, and significant thermal insulation has been specified to prevent any heat absorbed being transferred into the building. <u>Passive Ventilation</u> - Openable windows have been specified to facilitate natural ventilation. The placements of the openings enhance the cross ventilation effect, which will be achieved by opening windows on two facades and ensuring there is a clear path for airflow.
Be Green	PV panels have been proposed for the development to generate electricity for the development. The maximum available roof area for PV cells is 19m2, equivalent to 2.75kWp.

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Energy and CO_2
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Energy Strategy Summary

An assessment has been completed by Camell Warren Associates to assess the potential to reduce energy and related CO_2 emissions from the 16 Avenue Road project. The target reduction has been set at 20% relative to Part L 2013 to ensure the scheme is considered low carbon, in accordance with Camden planning requirements.

Energy efficiency is the first approach to reaching the target reduction. Through carrying out option appraisals on the facade design and building services, a specification has been determined that will allow the development to achieve a 2.5% reduction in overall CO_2 emissions.

The specification of CHP system to generate electricity and heat energy combined with PV panels to generate electricity has created an energy efficient design able to achieve a 35.48% reduction in total CO_2 emissions. The breakdown in these carbon emissions were summarised on page 10.

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Energy and CO_2
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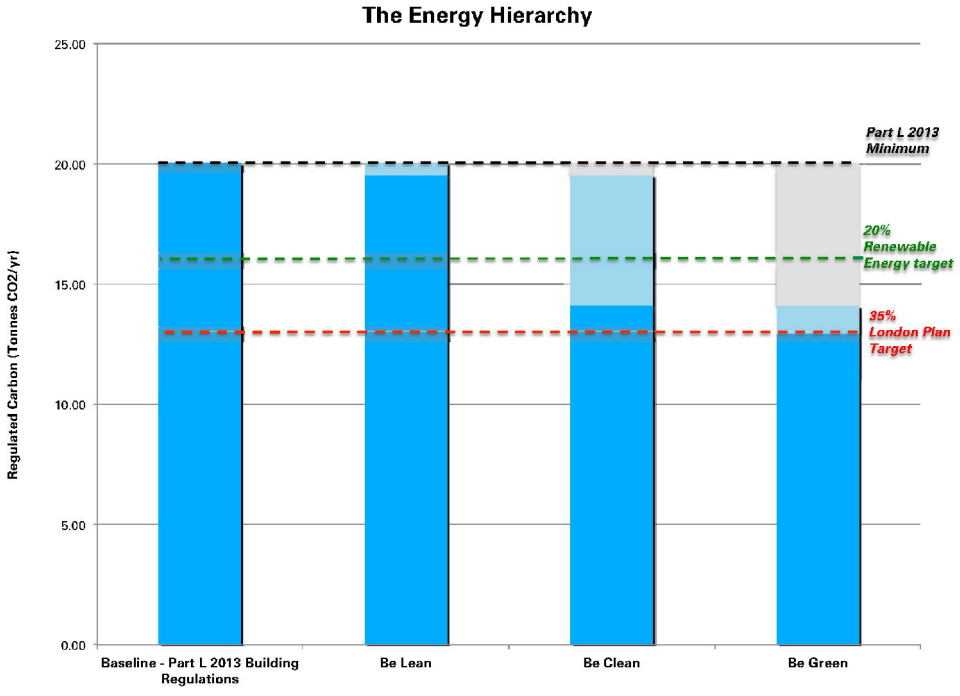
Energy and CO_2 graph:

A graphical illustration of how the scheme performs in relation to Building Regulations and the Energy Hierarchy is shown below[2].



[2] The graph was created based on figures provided from Carnell Warren Associates Energy Strategy Summary and associated SAP calculation worksheets

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Materials and Waste
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Materials and Waste Introduction

Sustainable material sourcing and waste management will be considered throughout the life of the building to ensure the scheme's environmental footprint is minimised as far as possible. The scheme will also ensure low embodied carbon throughout the procurement, transport and construction of building materials, together with end of life emissions.

Materials Selection and Sourcing

New construction materials will be selected, where feasible, with a low environmental impact. In addition, the project will aim for at least 10% of new materials to come from a recycled or reused source. Basic building and finishing elements will be sustainably procured and sourced, prioritising of local suppliers and manufacturers to encourage growth in economic activity within the London Borough of Camden.

The Green Guide for Specification is a reference tool, providing guidance on the relative environmental impacts for a range of different building elemental specifications, based on Life Cycle Assessment and the Environmental Profile Methodology. The design team has committed to using the Green Guide to Specification to help specify materials with a low environmental impact, where feasible.

In addition, the project team has committed to responsibly source materials used on site. This will include, where feasible, non-timber elements to be ISO 14001 or BES 6001 certified and 100% timber to be sourced from FSC or PEFC certified sources.

Waste Management – Construction Waste

The 16 Avenue Road design team will promote resource efficiency through effective and appropriate management of demolition and construction site waste.

In line with the waste hierarchy, during the construction phase, the preferred approach should be:

- The use of reclaimed materials;
- The use of materials with higher levels of recycled content; and
- The use of new materials

For demolition, the following should be

- Prioritising the on site reuse of demolition materials;
- Recycle materials on site recycling, then off site recycling; and
- The least preferred option – disposal to landfill.

A site waste management plan will be developed for the site which adopts target best practice benchmarks for resource efficiency, details procedures and commitments to minimise non-hazardous and hazardous waste at the design stage and monitors/measures waste production on site.

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Waste Management – Construction Waste *(continued)*	The site waste management plan will also include procedures and commitments to sort and divert waste from landfill through the following: - Re-use on site; - Salvage/reclaim for re-use off-site; - Return to supplier via a 'take-back' scheme; - Recovery and recycling using an approved waste management contractor; and - Compost. In addition, the design team has committed to diverting at least 85% by weight or volume of construction waste from landfill, and comply with the Institute of Engineer's Demolition Protocol.
Waste Management – Operational Waste	Dedicated internal and external waste storage and recycling facilities for end users are proposed to encourage recycling. The storage space will provide inclusive access and usability. Camden operates a weekly front-of-property recycling collection service.
Embodied Carbon Analysis	The development considers a number of opportunities to cut embodied carbon, as follows: - A pre-demolition audit will be carried out to ensure any appropriate demolition materials are reused within the new development, utilising the reuse existing materials. This will create embodied carbon savings on the 'cradle to gate' stage of procurement - A materials efficiency strategy will be followed throughout the design, procurement and construction stages of development, to ensure the scheme produces less waste on site. For example, adjustment of some sizes will be made to minimise offcuts of materials, and some bespoke materials will be developed off-site. - The development has been designed to be efficient in terms of the amount of materials used to construct the dwelling. - Materials will be procured from the local area where possible, to reduce carbon through transportation. - Materials and products with a higher recycled content will be procured where feasible, as these have a low embodied carbon. - Consideration has been made to use of timber as a low embodied carbon alternative to steel and concrete where possible. - The design team have confirmed WRAPs guidance 'cutting embodied carbon in construction projects' will be followed.

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Water Management
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Water Management Introduction

The 16 Avenue Road design proposals recognise the need to create a scheme that is efficient and adaptable to future climatic scenarios.

Water Conservation

The design team is committed to achieve a significant reduction in water use for the development in 16 Avenue Road over typical performance.

Water efficient sanitary fittings will be installed in the house to achieve no more than 105 litres per person per day, in line with the London Borough of Camden Policy DM22. Indicatively this may include low flow shower-heads and taps, with toilets being dual flush, baths not exceeding specific overflow limits and low water consuming washing machines and dishwashers specified.

In addition, the development will include a water meter that will be visible to the future occupant.

Flood Risk and Sustainable Drainage

16 Avenue Road is located within Flood Zone 1; defined as an area with little or no risk to flooding where the annual probability of flooding with defences where they exist: River, tidal & coastal is <0.1% i.e. less than 1 in 1000 years.

The development will result in an increased area of hard standing on the site. A flood risk assessment, drainage & SuDS strategy has been produced, outlining a strategy to reduce surface water run-off from 7.36l/s to 4.86l/s.

Attenuation measures have been specified to manage the risk of surface water runoff. Mitigation measures will include the specification of green roofs and geo-cellular surface water attenuation to ensure surface water run-off following construction will not be detrimental to the environment, public well-being and the economy.

Flood map to demonstrate that 16 Avenue Road project (red circle) is located within Flood Zone 1:

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Biodiversity and People
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Biodiversity and People Introduction

The proposed development will ensure ecological protection and enhancement and will respect the needs of neighbours and future occupants by creating a secure, inclusive and adaptable development.

The proposed development will promote the protection of any existing ecological features from damage during site demolition and the completion of the construction works. In addition the development will respect the needs of neighbours and future occupants by creating a secure, inclusive and adaptable development.

Land Use and Ecology

Ecology protection and enhancement
The design team are committed to help protect and enhance biodiversity on site. A bat survey will be carried out on the existing property to ensure bat protection is carried out in line with best practice and UK Legislation.

Planting will be carried out to encourage an increase in species numbers, whilst enhancing the local biodiversity by introducing native species. In addition, bird nesting boxes are to be provided on site.

The existing ecology will be protected where possible, with trees located outside of scope of works fully protected during construction with barrier fencing, and any trees and shrubs cleared outside of the bird breeding season (March-August);

Green Roof
An area of green roof will be installed on the flat roof at the rear of the proposed development, to provide the following ecological and sustainable benefits:

- Provision of habitat to promote species diversity;
- Reduction in urban heat island effect;
- Improvement in air quality;
- Minimisation of heat loss during winter months;
- Protection from solar gain during summer months; and
- Provision of a sustainable urban drainage technique.

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Biodiversity and People
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Construction Environmental Management

Environmental impacts of the construction works will be mitigated as far as possible. This will include the incorporation of the following:

- Contractor following environmental management system processes (under ISO14001), including the development of a construction environmental management plan (CEMP) specific to the sites.
- Training and site induction of all site operatives.
- Monitoring of energy, water and transport to and from site during construction.
- Management of waste on site and minimisation of air pollution.
- Following best practice pollution guidance from the Environment Agency,
- Ensuring all site timber is responsibly sourced in line with the UK Government's Timber Procurement Policy.

Considerate Constructors

The scheme will be registered under the Considerate Constructors Scheme (CCS) and is targeting at least 35 out of 50 points, including 7 points within each section of the scheme. The CCS scheme aims to recognise and encourage construction sites that are managed in an environmentally and socially considerate, responsible and accountable manner.

Occupant Wellbeing

The development has been designed to ensure the wellbeing of occupants in terms of levels of fresh air, thermal comfort and reduction of overheating, access to natural light, good lighting levels internally and externally, acoustic performance and access to safe drinking water.

The building services strategy has been carefully considered in order to balance the need for energy-smart, low carbon technologies with the need for adequate and controllable ventilation, heating and cooling.

The design team will specify all low VOC finishing products, including adhesives, sealants and paints. All composite wood product will have no added urea formaldehyde.

Overall, the development will promote health, wellbeing and community engagement within the local community.

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Biodiversity and People
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Sustainable Transport	16 Avenue Road is in proximity to a number of sustainable transport options, with a 7.01 Accessibility Index. It is located within 800 metres of St. John's Wood Underground Station, and within 300 metres of the nearest bus stop (Prince Albert Road, Stop D & G) providing a frequent service in both peak and off-peak hours.
Accessibility and Security	Design proposals have taken into consideration external and internal accessibility. This includes cyclist and pedestrian access to the sites. Creating a secure but fully accessible development is a key part of the development. To ensure this is achieved, the design team will adopt where feasible, the key principles of "Secured by Design" within all elements of the scheme. Home office facilities will be provided within the dwelling in order for the occupant to work from home and reduce the need for road transport. Cycle storage will be provided, which will be safe and secure.

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Conclusion
16 Avenue Road
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Conclusion:

This Sustainability Statement has responded to the London Borough of Camden's Local Plan requirements.

In summary the scheme will adopt the following sustainable features:

- Reduced energy consumption by targeting improved u values, airtightness, and low energy lighting;
- Low embodied carbon through efficient design, procurement of materials from a local source, or with a high recycled content, and reuse of materials on-site following demolition;
- Be located in a low flood risk zone;
- Be of high build quality, surpassing the minimum Building Regulations for water using fittings and source materials ethically and sustainability;
- Aim to source local labour throughout the construction phase;
- Ensure all materials are responsibly sourced and of low environmental impact;
- Implement a site waste management plan;
- Create a scheme that is efficient and adaptable to future climatic scenarios by installing water efficient sanitary fittings, and reducing flood risk through attenuation measures including geocellular surface water attenuation;
- Providing further attenuation measures, valuable habitat for flora and fauna, and insulation through the inclusion of a green roof;
- Ensure that there is no net loss of biodiversity as a result of the scheme; and
- Follow best practice policies in terms of air, water and ground pollution and appoint a contractor who will register for the Considerate Constructors Scheme.
- The development achieves a CO_2 emissions saving of 2.5% for its energy efficiency (be lean), 27.1% for its specification of the CHP system (be clean) and 5.9% for the recommended PV panel installation. This gives the scheme a total carbon reduction of 35.48% over Part L1A 2013.